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A review and general discussion of quantitative and qualitative techniques for the analysis of economic problems outside of education is presented to help educators discover new tools for planning, allocating, and evaluating educational resources. The pamphlet covers some major components of cost accounting, cost effectiveness, cost-benefit analysis, systems analysis, cost quality, and program budgeting. Given necessary modifications, these tools are found to have great potential in applications to education. While adoption of newer techniques is urged, the continued usefulness of older approaches is defended. (TT)

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APPROACHES TO THE ANALYSIS OF SCHOOL COSTS

AN INTRODUCTION

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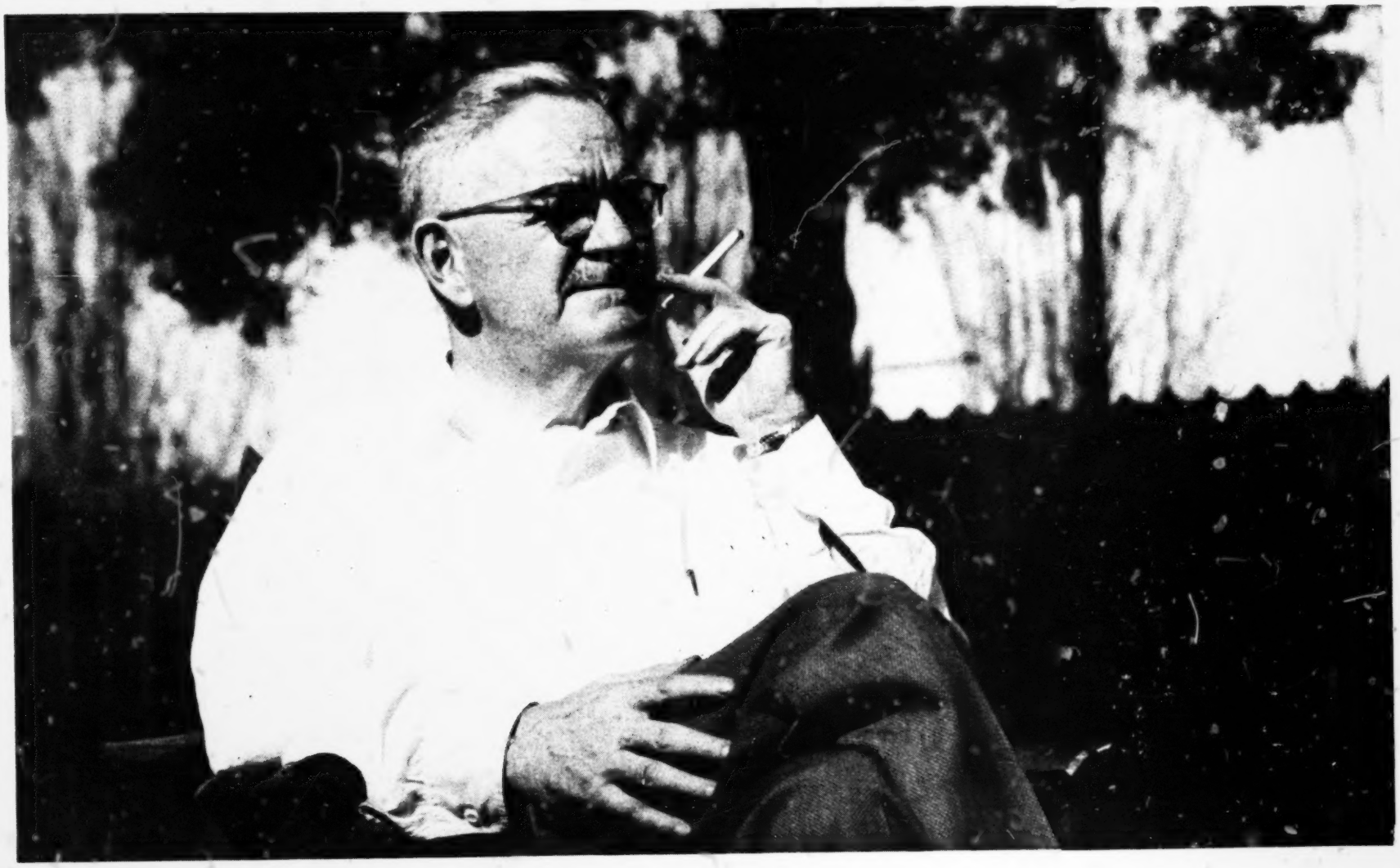
By Thomas Payzant



In 1965-1966, the New England School Development Council established, in honor of its founder, the Alfred Dexter Simpson Fellowship. This Fellowship provides for the appointment each year of a doctoral candidate in administration at the Graduate School of Education of Harvard University to serve at NESDEC as a research associate. In particular, the Fellow will study school finance, an area in which Professor Simpson was especially interested. The first Simpson Fellow has been Thomas Payzant; the results of his study are published here as *The Analysis of School Costs: An Introduction.*

Recent studies, such as the Coleman Report on *The Equality of Educational Opportunity*[1] or the United States Commission on Civil Rights' *Racial Isolation in the Schools*,[2] challenge traditional assumptions about the kinds of differences schools make in the lives of children. There is agreement that education is an important component of each person's life, but we now realize that a person receives only a small part of his education from his formal schooling. The difficult question is, what kind of education makes a difference and what segment of this education is the responsibility of the public schools in a democratic society?

For years the second part of this question has dominated the thinking of educators. Although quality education has long been the desired standard, a real understanding of what quality is or could be is almost as elusive today as it was a half a century ago. The feeling that some ultimate standard of quality does exist for public education is still widespread, and furthermore, it is felt to be definable, even measurable, and achievable by increased expenditures for schools. An elusive but generally held standard of quality calls for an education that allows each individual to develop his talents to the limits of his ability. Yet it becomes extremely difficult to define this general standard in operational terms.

If the question of quality education through quality schools is elusive, it is nonetheless relevant. We want the best, whatever it may be, for our children. To achieve the best, we must begin by defining clearly what we want to do and then produce the evidence that we are doing it. We need, therefore, to know a great deal more about the role the school can best play in the education of a child.

One alarming realization that stems from the suggestion that schools may not make the kind of impact that is traditionally assumed pertains to school finance. Are scarce financial resources sparingly allocated for public education being spent ineffectively and inefficiently? Experts in school finance have spent years attempting to demonstrate that there is a relation between expenditure for education and the quality of the education product. They have tried to prove that the higher the expenditure for education, the higher the quality of the product. Recent studies, however, question this rather widely accepted assumption. More money must be spent on education, but unless it is spent in a particular manner, about which we have much to learn, there is no guarantee that quality will increase. Across the board increases in school budgets may not affect positively the educational product. There may be a limit beyond which additional spending has little impact. The intelligent analysis of such queries will force schools to begin anew the herculean task of determining what they are getting for their money.

The purpose of this pamphlet is to review briefly a variety of techniques which have been used outside of education in the qualitative and quantitative analysis of economic problems. The pamphlet will review some of the major components of cost accounting, cost effectiveness, cost-benefit analysis, systems analysis, cost quality, and program budgeting. Some of these techniques have already been utilized in education. Others have been applied with little success. No one technique or combination of techniques is a panacea for the solution of the complex questions raised above. Yet, each technique suggests an approach that may be helpful to educators as they attempt to confront these questions in a systematic way. The review of the various techniques is only a first step. The relevance of new techniques for education can be best determined by involving schools in the experimental use of them.

Cost Accounting

In business and industry the process of cost accounting involves identifying the costs of the component parts of an operation. Cost accountants attempt to accumulate data on old and new methods of operation and to compare their costs. Such comparisons make possible more rational decisions about what, when, and how to change certain methods of operation. Cost accounting per se depends totally upon cost data. Cost accountants increasingly are making a concerted attempt to extend the mechanics of cost accounting to the sophisticated and difficult process of relating alternative methods of operation and their costs to the specific outcomes realized in implementing a particular method. In education, identification and measurement of specific outcomes is more difficult because of their frequently intangible nature. Therefore, sophisticated extensions of cost accounting have not been applied in education with much success. The school manager has been more concerned about compiling dollar outlays than about analyzing alternative programs for accomplishing a given objective.

Cost accounting can be a useful tool in some areas of educational decision making. For example, a straight-forward analysis of the cost of owning and operating a school transportation system as opposed

to contracting to a private firm might provide the rationale for a decision. But in making decisions concerning such things as the hiring of teachers, the school cannot depend upon the cost variable alone. It is useful to know the costs of recruiting—transportation, publication, share of the time of those that interview the teacher candidate, and so on. But decisions such as whether to hire inexperienced teachers with bachelor degrees rather than experienced teachers with masters degrees have implications far beyond cost.

Cost-Quality Studies

Cost-quality studies attempt to demonstrate a relationship between the cost of producing something and the quality of that produced. The maxim—that the higher the expenditure for the inputs of production the higher the quality of the product—has been demonstrated most reliably in industry, for there it has been fairly easy to identify the relationship between tangible inputs and tangible outputs.

In education, the task of relating cost to quality is complicated by the intangible nature of much of the input and output involved. Some educational input, such as teacher time, student time, books, and physical facilities, may be stated in quantifiable terms. But others, such as student and teacher motivation, family backgrounds, and school atmosphere, are quantified less readily. In spite of these difficulties, numerous studies have attempted to demonstrate that a positive relationship exists between the cost of education—more accurately, the money spent on input—and the quality of the product. Ideally the evidence of such a relationship, if it exists, should enable those responsible for educational policy to make intelligent decisions concerning spending. The ultimate concern of all those dealing with limited resources is with economy; in education this means buying the best quality educational program for the least amount of money. Every additional dollar spent does not bring the same degree of return; there is a ceiling above which further expenditure brings no further return. The problem, then, is twofold: to identify the point of diminishing return and, more importantly, to attach measurable value to the return or output so that decision makers in education can make intelligent decisions.

Analyzers have used two basic approaches to identify cost and quality variables. One approach starts with the amount of financial resource available to a school district. Measures of the ability of a community to pay for education, such as property valuations and personal income figures, provide information about the limitations that may constrain spending. Of course, some communities desire to make a greater effort to spend for education than others with comparable ability. Once the amount of available money is determined, the analyzer hypothesizes the kinds of programs and facilities that can be supported financially. Only at this point can planners begin to make judgments about the quality of the education that can be provided.

A second approach begins with assumptions about what makes quality education. These assumptions provide the basis for decisions about staff, materials, facilities, and so on. In an ideal world in which cost limitations provide little concern, the barriers to the implementation of the desired quality program would be minimal. Yet even those education planners that utilize this approach are caught short by the realities of costs and the limits of a district's financial resources long before assumptions about quality education can be institutionalized in real programs. The two approaches differ more in degree than in kind. The former emphasizes the constraints of cost at the outset; the latter does not allow financial considerations to dominate the initial stages of planning.

Regardless of the approach to finance (most school systems begin their planning with an analysis of the money that will be available, rather than planning the desired program and then seeking means of financing it) the objective of a cost-quality study is to demonstrate the relationship of the program and the facilities to cost and to the educational product. The goal is to establish a unit figure, usually expenditure per pupil, that can be used to indicate the quality level of a school district.

Several years ago the Educational Policies Commission developed a formula to express the cost-quality relationship.[3] The formula was based on their findings that in good school systems—defined as those schools with high levels of academic achievement and college admission—per pupil costs were twelve percent of the beginning salary of bachelor's degree teachers. The twelve percent figure was based on the following relationships:

1. The average salary of the professional staff is 1.7 times the initial salary;
2. The current expenditures for the salaries of professional staff equal approximately seventy percent of total costs;
3. Other current costs equal approximately thirty percent of total costs; and,
4. The ratio of professional staff to students is at

least fifty staff per thousand students.

The Commission stated that a per pupil expenditure derived from this formula roughly indicated a minimum quality expenditure standard.

Another approach to cost-quality studies was originally started by Paul Mort and has been developed in recent years by his proteges. These studies attempt to assess the quality of a school district by administering a quality measurement instrument. These instruments are designed to evaluate the quality of the educational *process* (what actually happens as the kinds of input combine to make a product, that is, the educated student). Most of them have been developed at the Institute for Administrative Research at Teachers College, Columbia University. Key instruments have been:

1. Mort and Cornell, *A Guide for Self Appraisal of School Systems,* 1937;
2. Mort, Burke, and Fiske, *A Guide for the Analysis and Description of Public School Services,* 1942;
3. Mort, Vincent, and Newall, *The Growing Edge,* 1945;
4. Mort and Pierce, *A Time Scale for Measuring the Adaptability of School Systems,* 1947; and,
5. Associated Public School Systems, *APSS Time Scale,* 1954.

Each of these instruments attempts to measure the 'adaptability' of the school system in which 'adaptability' is the criterion for quality and is defined as the 'capacity of an institution to respond to challenge to its role in society and to new insights concerning its techniques of operation.'[4] Each instrument focuses on the measurement of the educational process and its effect on adaptability. The approach produces a circular argument. It is no surprise that the high expenditure school districts were found to be the most 'adaptable.' It usually costs more money to change and introduce new programs than to retain the status quo; high expenditure school districts can more readily exercise their option to adopt innovations. These studies really show only that wealthier districts can and do buy more; they fail to give any definitive support to the notion that spending more automatically improves quality. If the quality criterion used had been one that did not depend upon increased expenditure, a quite different kind of relationship might have been demonstrated.

A second approach of those concerned with quality control is the measurement of output or product. Generally this is accomplished by administering standardized achievement tests to control and experimental groups. The analysis of the test results contains controls for intelligence and socioeconomic variables which affect such tests. These results are related, it is assumed, to the quality of the educational program. Of course such tests have their limitations and measure only one aspect of the school program (admittedly a pretty significant aspect), usually basic skill categories such as reading and arithmetic. The New York State Department of Education's 'Quality Measurement Project' and the University of Pittsburgh's 'Project Talent' have utilized this approach. Careful control of a wide range of variables has enabled researchers on these projects to compare data that provide new insights regarding the product of education produced in given school systems. Still, it is necessary to make value judgments about quality before cost data can be related to the product data collected in these studies.

A third approach of the quality control studies is to investigate certain community factors (social, political, economic) and thereby to attempt to assess the *level* of education in the school district. These social, political, and economic factors are supposedly indicators of community expectations for education. Increasingly these assumptions are validated by sociological research. Acceptance of the causative effect that community expectations have on the willingness to provide a certain level of education, however, does not help support the argument that higher spending necessarily results in higher quality education. This approach demonstrates that social class variables have a real impact on the school product; wealth is closely tied to social class, but the latter seems to be the dependent variable.

The most recent quality control instrument developed at Columbia to measure educational process attempts to assess the degree to which schools provide for 'quality-related procedures.' These are:

1. *Individualized Procedures.* Arrangements and practices that show an awareness of the fact that children differ from each other in many respects: rate of growth, background, goals, capacities, etc.
2. *Interpersonal Regard.* A general school atmosphere that reflects warmth among pupils and between teachers and pupils; teaching-learning behavior that is characterized by humaneness and respect.
3. *Creative Expression and Divergence of Thinking.* An opportunity for various expression of intelligence and talent; a technique which encourages intellectual pioneering by pupils.
4. *Group Activity.* The utilization of group interac-

tion and interpersonal facilitation; the recognition of the group as an important instrument in learning.[5]

Each of these categories has been broken down into subcategories of related behavior that can be observed and recorded by a trained observer sitting in the classroom. Types of behavior are identified by descriptive labels. The results of the observations are assigned quantifiable values and then related to cost data acquired from the participating school districts. It is not surprising to discover that high cost school districts often rank high on this quality-control instrument because it is these districts that have large numbers of parents engaged in the professions that seem to share these kinds of values and that insist on their institutionalization in the schools. The instruments do not suggest that, given high expenditure levels, the kinds of behavior measured could or should be bought to provide quality. Again, the standard of quality is elusive and the expenditure variable is one of many that relate to the chosen standard.

If one is willing to make assumptions about quality and to put forth some kind of priority criteria list, it is perhaps feasible to develop a quality-control instrument for those that share the values underlying the quality criterion. But it is also necessary to administer the instrument in a reliable, objective fashion and at the same time to supply controls for all the variables that may influence the quality criterion.

What have the cost-quality studies shown?[6] Early studies demonstrated that spending more money for schools provides better-prepared teaching staffs, more instructional material, and better student attendance.[7] These early studies did not measure educational returns, but they assumed that returns would be better with higher spending levels. A second group of studies showed that students on the average achieve higher scores on tests in reading and arithmetic in high per pupil expenditure districts compared with low per pupil expenditure districts.[8] A third group of studies has attempted to undertake research on educational quality more comprehensively, recognizing that teaching personnel and facilities are only means to achieving quality education.[9] These studies have shown that communities in which per pupil expenditure is high make better use of the current research on learning and do a better job of meeting the needs of individual children than communities with lower per pupil expenditure. A study by Lorne Woollatt[10] demonstrated that there may be a point of diminishing return in spending for education. The question today is not, 'Is there a point of diminishing return?' but, 'How can it be identified?' Studies by Brickell[11] and Bothwell[12] have shown that expenditures for minor items may advance school quality more than might be expected by their small amount. A longitudinal study by Furno[13] showed that the effects of high spending in a district over a period of twenty-five years were cumulative and that periodic years of high spending were not as important for raising educational quality as sustained efforts. Finally, studies by Norton[14] have shown that people in states with high expenditure levels for schools achieve more and have higher earning capacities than states with low expenditure levels, a a correlation that in retrospect appears spurious.

Most of these studies have indicated that money is an important factor in achieving educational quality. They have also shown that the cost-quality relationship is a complicated one. It would, however, be a mistake to assume that cost is the only critical factor in determining school quality. Factors such as the parents' socioeconomic level and level of educational achievement, and community attitudes toward the value of education, appear increasingly to be more important in determining the quality of education than cost.

Productivity

A measure of productivity demonstrates the relationship between input, the factors of production, and output, the product; that is, the ratio of output to input provides an 'index of productivity.'[15] Changes in the index provide the producer with knowledge about the effectiveness of his production. The producer constantly seeks to combine input in more economic ways to produce higher quality products. It is a qualitative rather than a quantitative measure; increase in the quantity of the output does not guarantee an increase in productivity. Business and industry have used productivity measures to assess the effectiveness of applying new kinds of knowledge as well as to assess the application of existing knowledge.

Highly reliable productivity indices have been difficult to develop in all sectors of the economy, but education presents some particularly difficult barriers. Most economists agree that improvements in the level of schooling do have a positive effect on economic productivity, but they are less successful in relating given changes in expenditures on public education to corresponding quantitative changes in productivity. As yet economists and educators have been unable to establish direct dollar relationships between input and output in education. At this point, educators can not

rely on any scientific measure of productivity to justify increased expenditures to school boards and the public.

General arguments about productivity and education may be useful. Professor Theodore Schultz has said:

> Investment in education has risen at a rapid rate and by itself may well account for a substantial part of the otherwise unexplained rise in earnings. . . . My preliminary estimates suggest that the stock of education in the labor force rose about eight and a half times between 1900 and 1956, whereas the stock of reproducible capital rose four and a half times, both in 1956 prices.[16]

Professor Harold F. Clark similarly argued for the importance of education in the general productivity of our economy when he said:

> Although . . . nations vary greatly in their natural resources, climate and cultural heritage, the high correlation between literacy and per capita income indicates that education is a dominant factor in the economic well-being of any people.[17]

Other economists place less faith in the contribution of education to general economic productivity. They argue that knowledge is derived from many sources, formal schooling being only one, and that it is difficult to say that formal schooling is responsible for a specific amount of education's contribution to productivity.[18] Some school finance specialists such as H. Thomas James have argued that education has been highly valued as an end in itself in our western culture and, in spite of the more recent 'materialistic image' of education, it would be a mistake to assume that all education is directed toward the production of 'the more efficient economic man.'[19]

Systems Analysis, Cost-Benefit Analysis, and Cost Effectiveness

'Systems analysis,' 'cost-benefit analysis,' and 'cost effectiveness' utilize similar techniques. The terms are often used interchangeably. Regardless of the label, each technique uses the basic approach of systems analysis. Whereas cost-effectiveness studies usually refer to an analysis of something very specific—such as the cost for realizing a given increment in achievement—cost-benefit analysis usually refers to something more global and encompasses, for example, crime reduction.

The basic principle behind systems analysis is 'the comparison of alternative means of carrying out some function. when those means are rather complicated and comprise a number of interrelated elements.'[20] A system exists when any set of factors operates to produce one or more kinds of output. All systems have a number of possible combinations of input to produce given output. The primary task of the system analyst is to analyze the effect of different combinations of input and then to assess their cost.

The analyst begins by specifying objectives—the nature of the anticipated output. He then identifies alternative means for accomplishing the objective. Each alternative may be a system in its own right. The alternatives each arrange the resources (input) needed to accomplish the objective in a different manner. The analyst attaches units of cost, for example, dollars or time, to the alternatives. He then attempts to build a model which will simulate the relationships between the input and output under alternative combinations of input. Using some criterion—dollars, time, performance, etc.—he decides finally on the preferred alternative. By establishing a clearer understanding of the possible combinations of input and their effect on output the analyst may make more reliable recommendations regarding the superiority of one system over another in accomplishing a stated objective than *would otherwise be possible.*

Systems analysis is more easily adapted in industry where the input and output of a production system are quantifiable. It may have, however, greater relevance for education. Charles Benson has written that cost effectiveness or systems analysis is more promising than the approach traditionally taken in cost-quality studies because it begins with a more refined statement of objectives, draws sharper distinctions between primary and secondary objectives, attempts to describe the instructional setting more precisely, and focuses on the cost of alternative instructional practices.[21] Professors Kershaw and McKean claim that it is now possible to compare a school system as it exists and as it might be after one or more changes are introduced in a carefully controlled situation.[22] This approach is not used in comparing two or more existing school systems unless they should happen to be alike in all but one category. Only under these conditions, with controls for all the variables except one, could such a comparison be made and statements be made about the impact of the variable in question.

In short, systems analysis, cost-benefit analysis, or studies in cost effectiveness may help decision makers:

1. to determine the changes in output resulting from the variation of input;
2. to estimate the changes in cost that result from

varying the input; and,
3. to compare alternative approaches to the solution of a given problem.

In essence, the systems analyst is using a rational process to relate the benefits of certain cost patterns to the effectiveness of production. He is concerned with output resulting from specific combinations of input rather than with the process involved in the input-output relationship. His problem is to measure in quantifiable terms the output of education. He is also pretty much limited to those aspects of the educational program—namely, the academic—that can be measured by existing testing instruments. At present, this approach has great applicability in the analysis of any number of fairly discrete systems that exist in a single school district. Systems analysis techniques as presently developed will not be as effective in the comparative analysis of a large sample of school districts because of the problems involved in attempting to validate data and to control the numerous variables that change conditions from one school district to another.

Budgeting Techniques

School administrators have historically viewed the budget as one major, if not central, tool with which they work. The budget may provide the greatest potential for success; it may also produce serious constraints that limit effectiveness. Scholars in school finance have emphasized a variety of factors in their definitions of the school budget and budget making. An equilateral triangle symbolically represents the three dimensions of De Young's concept of the budget.[23] He indicates that the educational plan should have priority over the spending and financing plans, but he consistently challenges the effective administrator to weave together skillfully the three 'equal' dimensions of the budget process. Ovsiew calls the budget '. . . an instrument through which current and long-range educational programs may be implemented.'[24] Budget making, he has written, is a 'process' involving the planning of educational policy to achieve a community's educational aspirations through the involvement of people.[25] Mort feels that the budget helps define '. . . the school program in terms of the amount of money to be spent and the amount to be derived from different sources.'[26] He, like De Young, urges budget makers to give priority to the educational plan before considering plans for expenditure and finance. Benson, on the other hand, disagrees with this emphasis. To him the budget is '. . . essentially a financial plan . . . encompassing estimates both of anticipated expenditures and of anticipated revenues.'[27] In budget making, because '. . . school expenditures are so "open ended" . . . the detailed consideration of an ideal program in most districts can be nothing more than an intellectual pastime.'[28] He concludes that administrators of necessity first investigate amounts of available resources and then turn to problems of allocation.

During the past several years many discussions regarding budgets and the budget-making process have deemphasized the arguments put forth by De Young, Mort, and Ovsiew. There is little indication, however, that the practicing school administrator's views regarding the importance of the budget and the budget-making process have changed significantly, although the conceptual analysis of the budgetary process seems to be moving in new directions. Thomas writes of a three-dimensional budgetary process.[29] One dimension, the economic, emphasizes the efficient allocation of scarce resources. A second, the technical, relies on the contribution of educational knowledge. Finally, the political dimension encompasses the forces that affect resource demand and supply.

Although Thomas reflects some of the ideas expressed by such predecessors as De Young, he explicitly emphasizes the role that rational decision making plays with each dimension of budget making and implementation. He recognizes the need for school administrators to become more concerned with rational decision making and its implications for planned change. James has found evidence to support this contention in his study of school finance in large cities.[30] 'If there is one generalization with important policy implications,' he has written, 'to be drawn from this study, it is this: Local tax-paying ability is the most important determinant of social policy for education in American cities. Until we find the means to reverse that equation, and let social policy determine the resources to be allocated to education, we face a rising sea of trouble. . . .'[31] The techniques that the social sciences are currently contributing particularly in the economic and political spheres of the budget process and its administration provide new tools to improve the quality of decision making. Administrators must learn to use these tools effectively if they expect to reverse the 'equation' that the James study identifies. It appears that program budgeting qualifies as one of these tools and will provide substantial assistance not only for the administrator that makes routine decisions that guarantee survival, but also for the planners

of change.

Planning Programming Budgeting Systems (PPBS)

A planning programming budgeting system utilizes a classification '. . . that emphasizes the things which a government [or any organization] does rather than the things which it buys.'[32] Classification by end products '. . . shifts the emphasis from the means of accomplishment itself.'[33] This system of budgeting, then, enables the school administrator to view individual programs—such as remedial reading in the primary grades—as revenues, expenditures, and outcomes. By focusing his budgeting on specific programs he has a better chance to evaluate, perhaps by student performance or some other criteria, the effect of spending dollars in a particular manner. Such evidence, when it is available from a number of programs, provides the administrator with a clearer understanding of alternative patterns of expenditure, an understanding that will presumably provide a more concrete base for rational decision making.

The techniques used in PPBS are similar to those used in systems analysis. The systems analyst begins by stating his functional objectives—his planning stage. He then formulates a system model that represents a particular application of his resources. In short, he organizes his program. He builds into his model some kind of performance criteria so that he can compare alternative approaches to realizing objectives. The comparison of alternatives leads to action recommendations that suggest the most appropriate method for meeting the original objectives. The purpose of the technique is to effect more rational decision making.

The practitioner of PPBS engages in a similar process in which each of the components of PPBS contribute to rational decision making. The planning stage requires the specific definition of objectives—a median increase in reading achievement of one year (measured by a standard reading achievement test) for a particular class in a particular school during a particular period of time. The programming function outlines the combination of activities—instructors, time, space, materials, and so on—that will produce the distinguishable results. Several different programs that utilize different combinations of resources and activities might be attempted and, through the control of variables, might be analyzed to determine their relative effectiveness in achieving the objectives. Budgeting provides the mechanism for allocating the resources. A limited amount of resources is available for any given program. The system pulls the planning, programming, and budgeting together. The planning stage may produce a plan with poorly defined costs but well-defined purposes, and the budgeting may produce a plan with poorly defined purposes, but well-defined costs. Bringing these functions together under a single process is helpful in eliminating contradictions and inconsistencies that often arise when they are treated separately.

Planning is the primary focus of this approach to budgeting. Traditional planning has meant assembling a series of statements about what needs to be done—such as building more buildings, buying supplies, and hiring personnel—year by year. Such planning often fails to consider purposes or alternative approaches. Finances may be ignored. Resulting plans may even be outdated before they are implemented.

PPBS approaches planning as a process. Any plan is not an end in itself; it represents one more step in a continuous process of devising means to accomplish best specific objectives. The planning function does not provide the definitive answers for the decision maker. It provides a wide range of choices that should enable the decision maker to understand what is and what can be. With this kind of knowledge the decision maker can do more than simply reestablish the status quo from year to year. On the other hand he will not be doing something new for its own sake. Neither will he spend more simply because higher expenditures have been traditionally linked to improvement in quality. He should, however, be able to allocate more efficiently the resources that are available.

PPBS has potential as a tool to assist the educational decision maker, but it is no panacea. It is currently more an art than a science. PPBS has problems similar to those identified with cost quality, cost effectiveness, systems analysis and other decision-making tools. In education it is extremely difficult to define objectives specifically. One approach is to rely on market criteria and measure earnings. Other approaches rely almost exclusively on the intuition of the administrator or persons defining the objectives. In each case the objectives are based upon value judgments made by men. A second problem involves the criteria for deciding the efficiency of a particular program. Educators have not developed methods for relating specific programs to their objectives. It is not enough to compare standard input, such as teachers' salaries, facilities, the socioeconomic background of students. The question of efficiency is more complex. The question is, when should a certain amount of a given input be added to a system to produce the desired effect? In education, the central problem is seeking knowledge about the

periods in a child's life when dramatic changes should be made in educational input to achieve the desired output that will make a difference.

Hopefully, the techniques outlined here will assist educators in planning, allocating, and evaluating resources for education. These tools have great potential, but much work remains to be done on them before they will become widely applicable to education. Studies that utilize some of these tools have challenged some basic assumptions of school finance. Most notably, there is no longer the assurance that increases in spending will correspond to increases in quality. Traditional methods of budgeting are being questioned. Incrementalism, increasing expenditures each year just enough to retain the status quo, is under fire. Comparing costs between school districts is questioned because of the lack of comparable data and the number of variables that seem sure to make school districts more different than alike. One district's necessities may be another district's frills.

This review of some analytical tools for utilization in educational decision making suggests that old approaches should not remain sacrosanct. But the implication is not, as some of the advocates of the newer methods would suggest, that older methods such as line item budgeting and comparing expenditure data are no longer useful. It is essential that the limits of any method be recognized as well as its potential. Understanding of both the potential and the limits of new and old techniques will be advanced only through increased experimentation in the schools.

Footnotes

[1]James S. Coleman *et al., Equality of Educational Opportunity* (United States Department of Health, Education, and Welfare, Washington, D.C.: United States Government Printing Office, 1967).

[2]United States Commission on Civil Rights, *Racial Isolation in the Public Schools* (2 vols.; Washington, D.C.: United States Government Printing Office, 1967).

[3]This formula is discussed in National Education Association, Special Project on School Finance, *Financing the Public Schools, 1960-1970* (Washington, D.C.: National Education Association, 1962), 22.

[4]Donald Ross (ed.), *Administration for Adaptability* (New York: Metropolitan School Study Council, Teachers College, Columbia University, 1958).

[5]Metropolitan School Study Council, *Exchange,* XXV (Winter, 1967), 8.

[6]John K. Norton (ed.), *Dimensions in School Finance* (Washington, D.C.: National Education Association, Committee on Educational Finance, 1966), 33-45.

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